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EFFECTIVENESS OF ATTENTION RELEVANCE CONFIDENCE SATISFACTION MODEL ON MATHEMATICS ANXIETY AMONG STUDENTS AT SECONDARY LEVEL

Education

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ABSTRACT

The study was designed to explore the effectiveness of Attention Relevance Confidence Satisfaction Model on Mathematics Anxiety of students at secondary school level. The ARCS model is a very useful model for teachers who want to analyze their classes through action research. It can be a teacher friendly model that is effective when teachers use motivational strategies that are suited to their students and observe student's reactions closely. For some people dealing with numbers or math-related situations evokes an emotional response that disrupts their performance especially with students. Mathematics anxiety has been found to decrease the efficiency of an individual's working memory. The findings of the study indicate that instruction through ARCS model helps students to reduce their Mathematics Anxiety.

KEYWORDS:

ARCS model, Mathematics Anxiety, Motivation

INTRODUCTION

Knowledge will forever govern ignorance; and people who mean to be their own governors must arm themselves with the power which knowledge gives. This powerful quote by James Madison represents the basic goal for obtaining knowledge. Designing effective instruction using sound strategies is essential to providing learners with the opportunities to attain knowledge and become powerful governors of their own lives.

The Attention Relevance Confidence Satisfaction Model (ARCS model) was developed to answer the question of how to teach students in such a way as to simulate motivation to learn, the question that no theories or models of motivation have yet answered. The ARCS model is an application of educational psychological theories and is based on expectancy – value theories. In this model, motivation is viewed as a dynamic process that changes over time and proceeds through three stages. In the first or preactional stage, motivation is generated. In the next or actional stage, the generated motivation needs to be maintained if learners are to pursue and complete activities they are faced with. The quality of the learning experience, sense autonomy, and teacher's influence (instruction style, performance appraisal, task presentation, and feedback) are most relevant during this stage. The postactional stage follows the completion of action. It concerns the learner's retrospective evaluation, which in turn determines the kind of activities they will pursue in the future.

The ARCS model is an example of a well documented design theory that is centered on the importance of motivation to account for performance differences among learners. The ARCS focuses on the conditions necessary to be sustained to keep the learner interested in the topic. The ARCS Model explains how students will put forth more effort and thus learn more when they are motivated to do so. The ARCS model consists of four basic concepts that lead to greater motivation. These concepts are attention, relevance, confidence, and satisfaction. The model is an application of educational psychological theories to instructional design and offers a repertoire of practical and specific motivational strategies.

NEED AND SIGNIFICANCE OF THE STUDY

Amongst the subjects taught in schools, Mathematics is considered as one of the toughest subjects with poor performances of students. The lower level of pass percentage has been a matter of serious concern. The course curriculum is only one factor responsible for imparting quality education. There are other academic environment factors governing the success of secondary education to achieve its goal. It is being often told that there exists phobia towards Mathematics learning amongst the student communities of secondary schools.

The ARCS model of motivational design consists of a set of categories of motivational concepts and strategies that are derived from a synthesis of the research on human motivation combined with a review of successful motivational practices. The ARCS model is a problem solving approach to designing the motivational aspects of learning environments to stimulate and sustain students' motivation to learn. There are two major parts to the model. The first is a set of categories representing the components of motivation. The second part of the model is a systematic design process that assists you in creating motivational enhancements that are appropriate for a given set of learners. Various articles by Keller provide active, prescribed statements that present specific classroom actions that can be performed to increase attention, relevance, confidence, and satisfaction.

STATEMENT OF THE PROBLEM

The present study is entitled as "**EFFECTIVENESS OF ATTENTION RELEVANCE CONFIDENCE SATISFACTION MODEL ON MATHEMATICS ANXIETY AMONG STUDENTS AT SECONDARY LEVEL**"

OBJECTIVES OF THE STUDY

- To find out Mathematics Anxiety among secondary school student taught using Attention Relevance Confidence Satisfaction Model and present Activity Oriented method.
- To compare Mathematics Anxiety of secondary school student taught using Attention Relevance Confidence Satisfaction Model and present Activity Oriented method.

HYPOTHESES OF THE STUDY

The Mathematics Anxiety of secondary school student taught using Attention Relevance Confidence Satisfaction Model is significantly higher than that of those taught using present Activity Oriented method.

METHOD USED

The study will be conducted using experimental method.

TOOLS USED

1. Lesson transcripts based on ARCS Model
2. Lesson transcripts based on Activity Oriented method of teaching
3. Mathematics Anxiety Scale

MATHEMATICS ANXIETY SCALE

Several definitions of math anxiety have been proposed overthe

years, including "an irrational and impeditive dread of mathematics" (Lazarus, 1974, p. 551), "the panic, helplessness, paralysis and mental disorganization that arises among some people when they are required to solve a mathematical problem" (Tobias, 1978, p. 65), a "general fear of contact with mathematics" (Hembree, 1990, p. 45) or the "feeling of tension, apprehension or even dread, that interferes with the ordinary manipulation of numbers and the solving of mathematical problems" (Ashcraft & Faust, 1994, p. 98).

This term is used to describe the panic, helplessness, mental paralysis and disorganisation that arise among some individuals when they are required to solve a problem of Mathematical nature. Mathematics anxiety refers to a person's feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary and academic situations. Psychologists Richardson and Suinn (1972), defined math anxiety as the "feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of ordinary life and academic situations" (p. 551).

In this study the investigator developed a Mathematics Anxiety Scale to measure the student's Mathematics Anxiety. For the development of Mathematics Anxiety Scale, statements expressive of anxiety toward mathematics were written after a careful study of related literature and discussion with several experienced teachers in the field of Mathematics and Education. Mathematics Anxiety Scale consists of 30 items, out of which 15 are positive statements and 15 are negative statements. Each item is to measure the anxiety of students towards Mathematics. The three responses of agreements or disagreements are given as Yes, Undecided, and No. The reliability was found to be 0.784 by using Test- Retest method.

RESULTS AND DISCUSSIONS

The statistical measures computed are given in table 1

Table 1 Data and Result of Statistical Constants on Pre –test and Post-test Scores on Mathematics Anxiety of Students

Type of Scores	Groups	N	Mean	Median	Mode	SD	Skewness	Kurtosis
Pre-test	Exp.	55	61.73	63	63	8.37	-0.38	0.38
	Control	55	61	58	57	10.11	-0.25	1.04
Post - test	Exp.	55	48.11	48	46	5.99	-0.56	0.02
	Control	55	51.51	52	48	8.05	0.34	0.79

The Mean, Median and Mode do not vary much. Narrow Skewness and Kurtosis show that the sample is approximately normal. Standard Deviation also shows that the sample is almost homogeneous with regard to Mathematics Anxiety scores.

Comparison of Pre-test, Post-test and Gain scores on Mathematics Anxiety

The data and results of test of significance are given in Table 2

Table 2 Data and Result of Test of Significance of Difference between the Mean Pre-test, Post-test and Gain Scores on Mathematics Anxiety

Type of scores	Groups	N	Mean	S.D.	't' value	Level of significance
Pre-test	Experimental	55	61.73	8.36	0.41	p > 0.05
	Control	55	61.00	10.11		
Post-test	Experimental	55	48.11	5.99	2.91	p < 0.05
	Control	55	51.51	8.05		
Gain	Experimental	55	13.62	3.42	2.48	p < 0.05
	Control	55	9.49	11.89		

The analysis of the pre-test scores of students in the Experimental and Control groups showed no significant difference in Mathematics Anxiety. By comparing the post-test scores and gain scores on Mathematics Anxiety, it is found that the Experimental group is better than the Control group. So it can be concluded that, in reducing Mathematics Anxiety at Secondary level, ARCS Model is more effective than the Activity Oriented Method.

Analysis of Genuineness of the mean difference in Mathematics Anxiety of Experimental and Control groups

Since the sample selected for the present study were intact classroom groups from different institutions which were having a slight difference in the means of the pre-test scores, it is difficult to ascertain whether the difference between the pre-test scores resulted from the experimental factors or other variables. So the scores are again analysed using the technique of Analysis of Co-variance.

Table 3 Summary of ANOVA and ANCOVA of the Pre-test and Post - test Scores on Mathematics Anxiety of the Experimental and Control Groups

Source of variation	df	SSx	SSy	SSyx	MSyx	MSx	Msy	SDyx	Fyx	Fx	Fy
Among means	1	14.55	317.9	366.45	366.45	14.55	317.9	6.35	9.1	0.17	8.32
Within groups	107	93000.91	54307.09	43009.38	40.28	86.12	50.34				
Total	108	93105.45	57504.99	46705.82	406.72	-	-				

The obtained value of Fx is 0.17, which is not significant at 0.05 or 0.01 levels. It shows that there is no significant difference between pre-test scores of experimental and control groups with respect to their Mathematics Anxiety. The obtained Fy value is 8.32, which is significant at 0.01 level. This shows that the groups differ significantly on Mathematics Anxiety in the post-test scores.

The value of F for df 1/107 is 3.87 at 0.05 level and 6.72 at 0.01 level. Since the Fyx ratio is greater than the table value, it is significant (Fyx = 9.10; p < 0.01). The significant ratio for the adjusted post-test scores on Mathematics Anxiety show that the final mean scores of students in the Experimental group and Control group differ significantly after they were adjusted for the difference in the pre-test scores. The significant F ratio necessitates proceeding to test the difference separately by 't' test.

The adjusted means of the post test scores of students in the Experimental and Control groups were calculated using regression coefficients. The difference in adjusted means for post-test scores of the Experimental and Control groups were tested for significance for df 1/ 107. The obtained 't' value (3.54) is significant at 0.01 level. It shows that Attention Relevance Confidence Satisfaction Model is much better than the Activity Oriented Method in reducing Mathematics Anxiety among Secondary students.

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